

TAXONOMIC STATUS, ECOLOGY, AND DISTRIBUTION OF *CAREX HYALINA* (CYPERACEAE)

A. A. Reznicek
University of Michigan Herbarium
North University Building
Ann Arbor, Michigan 48109-1057

Robert F. C. Naczi
Department of Biological Sciences
Northern Kentucky University
Highland Heights, Kentucky 41099-0400

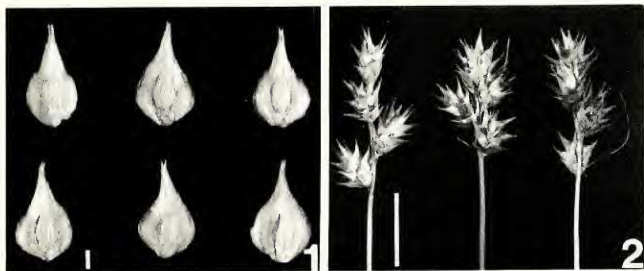
Carex hyalina Boott is a poorly understood species of the southeastern United States in the difficult and species-rich section *Ovales* Kunth. It was first described by Boott (1845) from a Drummond specimen collected along the Rio Brazos, Texas, but was later put by Boott (1862) into the synonymy of his broadly defined *C. straminea* Willd. Mackenzie (1931) resurrected *Carex hyalina* as a species and first distinguished it from the many other members of section *Ovales* within its range. Subsequently, essentially all authors have recognized it as a good species. Mackenzie reported *C. hyalina* only from Texas and Arkansas. The first report of the species from Oklahoma appears to be by Waterfall (1960). Finally, Orzell and Bridges (1987) summarized the distribution of the species up to that point, but *Carex hyalina* remained an obscure species with a poorly known distribution. Our aim is to remove this obscurity by clarifying the status of *C. hyalina*, including typifying the name, providing a comprehensive description, and distinguishing it from other species in the section. In addition, we provide information on its distinctive ecology as well as an up-to-date distribution map, supported by specimen citations, that considerably expands the known distribution of the species.

Carex hyalina Boott, Boston J. Nat. Hist. 5: 112. [7 Jan] 1845.—TYPE: Texas, [?Rio Brazos, 1833,] *Drummond s.n.* “from Mr Borrer & Mr Christy. 1836.” (holotype: K!; probable isotypes: Texas. Rio Brazos, *Drummond s.n.*, 1833, BM!, K-4 sheets!).

Loosely colonial in small patches by short-creeping rhizomes, rhizomes 0.5–7 mm long between shoots; fertile culms 25–95 cm tall, trigonous, smooth except just below inflorescence, where finely scabrous-angled; bladeless basal sheaths pale brown, rapidly disintegrating into short, dark brown fibers. Leaves 4–7, on the lower 1/5–2/5 of the culm; blades ca. 3–20 cm long, 1–2.7 mm wide, plicate, glabrous, the margins antrorsely scabrous; leaf sheaths ca. 2–8 cm long, tightly enveloping culms, glabrous, green; the inner band of sheaths glabrous, whitish hyaline, prolonged ca. 0.4–1.6 mm beyond the \pm auriculate leaf bases, the apex concave, whitish; ligules 2–3.5 mm long, rounded, the free portion entire to \pm erose, up to 0.7 mm long. Vegetative culms very different from the fertile, fully developed only after the perigynia are largely shed, annual or occasionally overwintering, but never becoming fertile, 12–40 cm tall with ca. 10–35 leaves; leaves tristichous and mostly clustered in the upper 1/4 of the culm, often larger than

those of the fertile culms, ca. 4–25 cm long and up to 3 mm wide. Inflorescences 1.3–4 cm long, the upper spikes usually overlapping, the lowest two spikes 2–9 mm distant; spikes single at nodes, sessile, lowermost bracts scalelike or sometimes with a setaceous awn, 0.4–3.7 cm long, inconspicuous, sheathless, the upper bracts much reduced; spikes 2–4 (–6), gynaeandrous; terminal spikes often slightly larger than the lateral, but otherwise essentially similar, clavate-ovoid, 8–18 mm long, pistillate portion 6–12.5 mm long, 6.5–12 mm wide, ca. 5–25 (–30)-flowered, staminate portion 1–8 (–11) mm long, 0.7–1.2 mm wide, ca. 2–10-flowered. Pistillate scales 2.3–3.8 mm long, 0.8–1.6 mm wide, narrowly ovate, obtuse to acute, silvery white to pale brown with a narrow green center, 1-nerved. Staminate scales 2.4–4.5 (–5.2) mm long, 1.1–1.6 mm wide, lanceolate to narrowly ovate, acute to acuminate, silvery white to pale brown with a narrow green center, 1-nerved. Perigynia (4–) 4.5–6.6 mm long, 2.2–3.5 mm wide, 1.6–2.4 times as long as wide, widely spreading at maturity, plano-convex to \pm biconvex with elliptic to \pm suborbicular bodies (2.2–) 2.8–4.7 mm long, 0.9–1.6 times as long as wide, widest 1–2.4 mm above base (0.2–0.4 of the total perigynium length), broadly winged and serrulate-margined except near base, \pm smooth or finely papillate, gradually tapered into a beak, green to pale brown, glabrous, sessile, adaxial side 3–7-nerved over achene, abaxial side 5–10-nerved over achene; beaks 1.4–2.8 mm long, 0.3–0.8 times as long as the body, strongly flattened and serrulate-margined to apex, the apex bidentate with scabrous-margined teeth ca. 0.1–0.4 mm long. Achenes 1.8–2.6 mm long, 0.9–1.2 mm wide, 1.7–2.4 times as long as wide, biconvex, narrowly ovate-oblong, pale brown, short-stipitate; style straight or very slightly contorted; stigmas 2. Anthers 3, ca. (1.1–) 1.3–2.6 mm long.

SPECIMENS EXAMINED. ARKANSAS. Hempstead Co.: near Fulton, 18 Apr 1901, *Canby 186 et al.* (GH); Fulton, 26 Apr 1905, *Bush 2459* (MO). Jackson Co.: near Newport, 26 Apr 1929, *Palmer 35530* (GH, MO); Hwy 69 at the Black River, west of Jacksonport, 27 Apr 1989, *Jones & Jones 2531* (MICH, TAES); Jacksonport, Jacksonport State Park, near the White River, 14 May 1989, *Naczi 2171* (MICH, UARK, etb). Little River Co.: 2.7 mi SW of Foreman along S side of rte. 108, just E of French Bayou, SE 1/4 sec. 29 T12S R32W, 16 May 1988, *Naczi 1913* (MICH). Miller Co.: 27 Apr 1905, *Bush 2475* (GH, MO); Texarkana, 28 Apr 1905, *Bush 2500* (MO). Pulaski Co.: May 1886, *Hasse s.n.* (KANU). St. Francis Co.: Linden Island south end of Madison, 29 May 1960, *McDaniel 1872* (etb).—MISSISSIPPI. Coahoma Co.: 2.5 mi NW of Lula, sect. 16, 2 May 1971, *McDaniel 15046* (etb); 2.5 mi NW of Lula, N of hwy US 49, T7S R13W, sec. 12 or 13, 24 Apr 1992, *Bryson 11381 & Newton* (MICH, etb). Tunica Co.: ca. 5 mi S of Tunica, 24 Apr 1992, *Bryson 11389 & Newton* (MICH, etb); ca. 4 mi SE of Tunica, 24 Apr 1992, *Bryson 11396 & Newton* (MICH, etb); ca. 11 mi S of Tunica, 24 Apr 1992, *Bryson 11408 & Newton* (MICH, etb).—OKLAHOMA. McCurtain Co.: 7 mi S & 1 E of Idabel, 15 Apr 1950, *Waterfall 9325* (BRIT/SMU, OKLA); 7 mi S of Idabel, 18 Apr 1954, *Waterfall 11805* (OKLA, TEX); 3.6 mi S of jct. of RR and rte. 259 in Idabel, along W side of rte. 259, 14 May 1988, *Naczi 1882* (BRIT/SMU, DUR, MICH, etb).—TEXAS. Bowie Co.: ca. 10 mi W of Bassett, 1.3 mi N of rte. 259–I-30 jct., along N side Sulphur River E of rte. 259, 11 May 1987, *Naczi 1567* (MICH). Brazoria Co.: Columbia, 31 Mar 1902, *Bush 1261* (GH, MO). Cass Co.: 4.4 mi NE of Naples, 11 May 1949, *Cory 55940* (BRIT/SMU). Dallas Co.: Dallas, Apr 1876, *Reverchon s.n.* (GH); Dallas, 1880, *Reverchon s.n.* (BRIT/SMU, NY); Dallas, 26 Mar 1901, *Reverchon s.n.* (GH, MO); Oak Cliff, 7 May 1901, *Reverchon 2426* (MO). Denton Co.: ca. 5 mi E of Denton: S of rte. 380 along W side of Trinity River, 10 May 1988, *Naczi 1859* (MICH, TAES, TEX). Houston Co.: along rte. 7, one mile east of Trinity River, 11 Apr 1964, *Correll & Correll 29125* (BRIT/SMU, LL). Lamar Co.: near Paris, Apr 1933, *Hampton s.n.* (US). Liberty Co.: Jct. of Hwy 162 and the Trinity River, SW side of the River, 4 May 1972, *Nixon 4637* (ASTC); 0.8 mi W on Hwy 105 from its jct. with the East Fork of the Trinity River, 8 May 1989, *Jones 2729 & Wipff* (ASTC, BRIT/SMU, MICH, TAES). Madison Co.: about 1 mi NW and W of the intersection of Hwy 21 and Trinity River, 7 Apr 1972, *Nixon 4063* (ASTC). Morris Co.: along E side of route 259 just W of the Sulphur River bridge (just N of I-30), 5 Jun 1989, *Reznicek 8489 & Naczi* (MICH, TAES, TRTE, WARM, etb). Polk Co.: Trinity River, 8.7 mi S on Hwy 59 from its jct with Hwy 190 in Livingston, 11 May 1988, *Wipff 830 &*

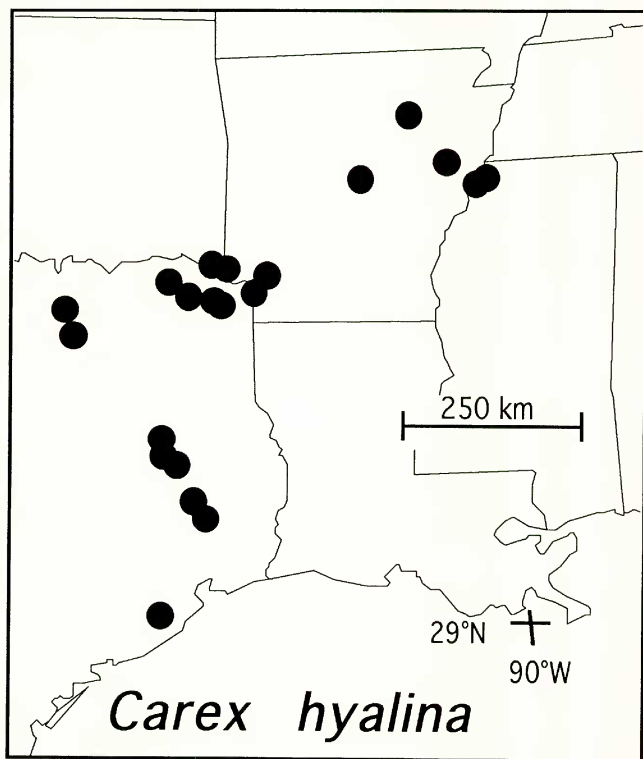


FIGS. 1, 2. Perigynia and inflorescences of *Carex hyalina*. Fig. 1. Perigynia showing long beaks (from living plant vouchered by Reznicek 8489 & Naczi). Scale: bar = 1 mm. Fig. 2. Inflorescences showing perigynia spreading in the spikes (from living plant vouchered by Reznicek 8489 & Naczi). Scale: bar = 1 cm.

Jones (MICH, PAUH, SAT, jkw, sdj). Red River Co.: ca. 4 mi SE of Jolntown: N of Sulphur River along W side rte. 271, 11 May 1988, Naczi 1864 (MICH, TEX, UARK). Walker Co.: Trinity River bottom, 20 Apr 1938, Warner 29 (CM, TEX); Sam Houston National Forest, Stubblefield Lake, SW of Huntsville, 11 Apr 1992, Jones & Jones 8243 (MICH, TAES).—WITHOUT DEFINITE LOCALITY: Herb. Boott ex herb. Chapman (K).

Specimens considered isotypes vary in the completeness of their label data, but all appear to be part of the same gathering, and it seems reasonable that Drummond should have found this uncommon species only once. The origin of the Chapman specimen noted by Boott (1862) is somewhat of a mystery, as *Carex hyalina* apparently does not occur in the areas where Chapman did most of his collecting. The specimen, however, looks suspiciously similar to the Drummond collections in aspect, stage of maturity, and preparation, and perhaps Chapman obtained one of these and failed to record the data. All three collections cited for this species by Orzell and Bridges (1987) were seen, but not at NY or PH, the herbaria they cited.

The affinities of *Carex hyalina* are somewhat uncertain. In spite of being poorly understood, it is actually a quite distinctive species with no apparent close relatives. The key in Jones and Reznicek (1991) effectively separates it from all the Texas species of section *Ovales*. In fact, the combination of large perigynia [(4–) 4.5–6.6 mm long, 2.2–3.5 mm wide], 3–7-nerved adaxially over the achene with long (1.4–2.8 mm), somewhat poorly defined beaks (Fig. 1), and spreading perigynia in few-flowered [5–25 (–30)] spikes (Fig. 2) is unique among members of section *Ovales* in the southeastern United States. The distinctive habit, colonial by short-prolonged rhizomes producing numerous, well-developed vegetative culms, as well as the slender, few-spiked [2–4 (–6)] fertile culms allow *C. hyalina* to be readily recognized in the field. Correll and Johnson (1970) note that the species that most resembles *C. hyalina*, especially when immature, is *C. brittoniana* L. H. Bailey, a larger plant of open habitats distributed mostly to the west and south of the range of *C. hyalina*. *Carex brittoniana* shares with *C. hyalina* large, long-beaked perigynia spreading in relatively few, and sometimes few-flowered, spikes and may well be the closest relative of *C. hyalina*. However, *C. brittoniana* has longer and much wider perigynia [(5.5–) 6–8.3 mm long, 3.7–6 mm wide],

FIG. 3. Distribution of *Carex hyalina*.

which are nerveless adaxially over the achene. Very young specimens of *C. brittoniana*, without fully developed perigynia, can normally be separated from *C. hyalina* by their longer anthers [(2.1–) 2.6–4.4 mm long] and longer staminate scales (especially on the terminal spike, 4.8–8.1 mm long), which usually have the midrib excurrent as a distinct awn. *Carex brittoniana* also lacks the well-developed vegetative culms that are such a prominent feature of *C. hyalina*.

Boott (1862) and Mackenzie (1931) cite *Carex tetrastachya* Scheele (1849) as a later synonym of *C. hyalina*. Unfortunately, efforts to find the type ("prope Neubraunfels leg. Römer") have been fruitless. Scheele's herbarium appears to be lost, and few Römer specimens are known. New Braunfels, Texas (Comal County), is at the east edge of the Edwards Plateau, well west of the presently

TABLE 1. Results of analyses of soil samples from populations of *Carex hyalina*.

| Locality | pH | Ca ppm | Fe ppm | K ppm | Mg ppm | P ppm | % org. matter | % sand | % silt | % clay | soil type |
|--|-----|-----------|-----------|----------|-----------|----------|------------------|-----------|-----------|-----------|-----------------------|
| Arkansas: Little River Co., <i>Naczi</i> 1913 | 7.7 | 7897 | 5 | 295 | 191 | 17 | 4.0 | 29.8 | 22.0 | 48.2 | clay |
| Mississippi: Coahoma Co., <i>Bryson</i> 11381 & <i>Newton</i> | 7.0 | 4000 | 140 | 328 | 771 | 47 | 6.6 | 37.1 | 16.7 | 46.2 | clay |
| Mississippi: Tunica Co., <i>Bryson</i> 11389 & <i>Newton</i> | 5.3 | 4000 | 139 | 480 | 922 | 55 | 5.4 | 17.1 | 14.7 | 68.2 | clay |
| Mississippi: Tunica Co., <i>Bryson</i> 11396 & <i>Newton</i> | 5.4 | 3663 | 155 | 516 | 986 | 62 | 5.5 | 15.1 | 18.7 | 66.2 | clay |
| Texas: Morris Co., <i>Reznicek</i> 8489 & <i>Naczi</i> | 7.0 | 6960 | 53 | 298 | 303 | 27 | 4.9 | 61.8 | 12.0 | 26.2 | sandy clay loam |
| Texas: Red River Co., <i>Naczi</i> 1864 | 7.5 | 8439 | 5 | 442 | 350 | 21 | 2.8 | 43.1 | 10.7 | 46.2 | clay |
| MEAN VALUES | 6.7 | 5827 | 83 | 393 | 587 | 38 | 4.9 | 34.0 | 15.8 | 50.2 | clay |

known range of *C. hyalina* (Fig. 3), which casts some doubt on Mackenzie's placement. The lack of information about the perigynia in the description may indicate that the Römer specimen was probably quite immature; however, Scheele described the scales of *C. tetrastrachya* as "excurrente aristatae," which would apply to the staminate scales of *C. brittoniana*, a species known from the New Braunfels region, but not at all to *C. hyalina*. The Schlottmann specimen (Labady Prairies, Texas, K!) cited by Boott (1862) and sent to him by Sonder as an exemplar of Scheele's *C. tetrastrachya* is a mixed collection of *C. brevior* (Dewey) Mack. and immature *C. brittoniana*. Mackenzie's other synonym, *C. straminea* "var. *hyalina* Boott," is not validly published, since Boott (1862) merely cited his *C. hyalina* as "a small variety" under his *C. straminea* var. *crawei*, and did not make the combination at varietal rank. Efforts to determine if this combination may have been made by later authors have thus far been unsuccessful.

Carex hyalina grows in shaded, wet soil of floodplains wooded with deciduous trees. Soils of *C. hyalina* habitats share several attributes (Table 1). The concentrations of calcium, potassium, magnesium, and phosphorous are high. In addition, the proportion of clay usually exceeds the silt and sand fractions. All but one of the soils analyzed possess a clay content greater than 45% and are classified as clays. The pH of these soils are usually nearly neutral. *Carex corrugata* Fernald is a constant or nearly constant associate of *C. hyalina* (Naczi & Bryson 1990). Other vascular plant species that frequently grow with *C. hyalina* include *C. blanda* Dewey, *C. bulbostylis* Mack., *C. cherokeensis* Schwein., *C. crus-corvi* Kunze, *C. socialis* Mohlenbr. & Schwegman, and *Ulmus crassifolia* Nutt.

Carex hyalina occurs in the west Gulf Coastal Plain and Mississippi Delta physiographic provinces in northwestern Mississippi, eastern and southwestern Arkansas, southeastern Oklahoma, and eastern Texas (Fig. 3). It grows in the drainage systems of a few large rivers: the Arkansas, Brazos, Mississippi, Red, St. Francis, Trinity, and White. Throughout its relatively small range, *C. hyalina* is often abundant where found, but local, probably due to its specific habitat. It should be sought on calcareous, alluvial clays elsewhere in the Southeast, especially in Louisiana, western Tennessee, and southeastern Missouri. The recent successes of field botanists in locating new populations of *C. hyalina* and expanding the known range of the species (Naczi & Bryson 1990; Bryson et al. 1992) emphasize how poorly known *C. hyalina* has been and make the discovery of the species in new regions quite likely. Only half a decade ago, *C. hyalina* was known from very few collections from a much smaller geographic range (Orzell & Bridges 1987). In fact, *C. hyalina* is currently being considered for addition to the United States List of Endangered and Threatened Plants (U.S. Fish & Wildlife Service 1990). Though *C. hyalina* is far from common, we believe its populations and individuals to be sufficiently numerous and secure that legal protection of the species under the U.S. Endangered Species Act is unwarranted.

ACKNOWLEDGMENTS

We thank the curators of all the herbaria we visited or from which we borrowed specimens, especially those that sent us all their *Ovales* so that we might glean a few sheets of *Carex hyalina*: ASTC, BM, BRIT/SMU, CM, DUR, GH, K, MICH, MO, NLU, NY, OKL, OKLA, PH, TEX/LL, UARK, US, ctb (C. T. Bryson personal herbarium), sdj (S. D. Jones personal herbarium), and jkw (J. K. Wipff personal herbarium). We are especially grateful to Charles Bryson for sending us soil samples and specimens from his new discoveries in Mississippi and Stanley Jones for duplicates of his collections in Texas and Arkansas. Gary Larson kindly sent us information on specimens of *C. hyalina* on loan to him.

LITERATURE CITED

- Boott, F. 1845. Descriptions of six new North American Carices. Boston J. Nat. Hist. 5: 112–116.
- Boott, F. 1862. *Illustrations of the Genus Carex*. Part III. London: William Pampplin.
- Bryson, C. T., R. F. C. Naczi, and S. McDaniel. 1992. Notes on noteworthy records of *Carex* (Cyperaceae) from the southeastern United States. Sida 15: 125–135.
- Correll, D. S., and M. C. Johnson. 1970. *Manual of the Vascular Plants of Texas*. Renner, Texas: Texas Research Foundation.
- Jones, S. D., and A. A. Reznicek. 1991. *Carex bicknellii*, "Bicknell's sedge" (Cyperaceae): new to Texas, with a key to Texas species of section *Ovales*. Phytologia 70: 115–118.
- Mackenzie, K. K. 1931. Cyperaceae—Cariceae. N. Amer. Flora 18(1–3): 1–168.
- Naczi, R. F. C., and C. T. Bryson. 1990. Noteworthy records of *Carex* (Cyperaceae) from the southeastern United States. Bartonica 56: 49–58.

- Orzell, S. L., and E. L. Bridges. 1987. Further additions and noteworthy collections in the flora of Arkansas, with historical, ecological, and phytogeographical notes. *Phytologia* 64: 81–144.
- Scheele, A. 1849. Beiträge zur Flora von Texas, Cyperaceae. *Linnaea* 22: 345–348.
- United States Fish and Wildlife Service. 1990. Endangered and threatened wildlife and plants; review of plant taxa for listing as endangered or threatened species. *Federal Register* 55: 6183–6229.
- Waterfall, U. T. 1960. *Keys to the Flora of Oklahoma*. Stillwater: Oklahoma State University.